effectiveness of sympathectomy for palmar or axillary hyperhidrosis remain high even 1 year after the procedure. A number of clinical studies reported that conventional VATS thoracic sympathectomies yielded a success rate of greater than 95% in the treatment of primary hyperhidrosis.[15-17] Our results are in keeping with these reports, with 96% of patients reporting substantial improvement of their PH and 72.2% of patients reporting disappearance of their AH. A total of 88.5% of patients showed a significant improvement in QOL after the procedure. Moreover, surgical incisions have been reduced from 4 in traditional techniques to 1 hidden in the umbilicus, leading to very favorable cosmetic benefits.

The most common secondary effect of thoracic sympathectomy is CS, which occurs soon after the surgery or many years later. The most affected areas are the upper and lower back, lower chest, abdomen, buttocks, groin, and backs of the thighs. The severity of CS can be divided into mild CS, moderate CS, and severe CS.[18] Mild CS creates moisture on the body, but does not penetrate through clothing. Moderate CS involves moisture that can show through clothes. Severe CS causes profuse sweating that stains one's shirts and pants. The reported frequencies of CS vary considerably. Licht and Pilegaard[18] reported an incidence of CS in 89% of patients in a series of 158 patients, and in 35% of patients it was so severe that they often had to change their clothes during the day. However, Li et al[19] reported the incidence of mild, moderate, and severe CS as only 13%, 8%, and 6%, respectively. A total of 28.6% of our patients developed CS by their 1-year follow-up evaluation, which is similar to the result of found in the study by Li et al.[19] The mechanism of CS is unknown. Deng et al[20] reported that the higher level sympathectomy interrupted the higher rate of CS happened, and the more destructive the procedure, the higher the risk of compensatory sweating.

This technique is still relatively challenging and requires longer surgical time, and it also takes time for thoracic surgeons to become familiar with gastroscopy. The limitations of this study were the small volume of patients and the lack of randomized clinical trials. Although there was no evidence of thoracic or abdominal organ injury during the surgery, the technique potentially increased the risk of intra-abdominal tissue injury.

CONCLUSIONS

Follow-up results show that E-NOTES yields a comparable cure rate with VATS for hyperhidrosis. In view of the unique characteristics of the surgical approach, we recommend the procedure as a new treatment option for the following patients with PH: patients who have a past history of breast augmentation and patients who do not want to have visible incisions on their chest.

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Discussion

Dr Vivek Rao *(Toronto, Ontario, Canada)*. Have you done other procedures other than hyperhidrosis through the transumbilical approach?

Dr Chen. No.

Dr Sergei Mitnovetski *(Toronto, Ontario, Canada)*. Dr Chen, I still do not see why you would prefer this approach. We know that thoracoscopic sympathectomy is an effective operation and the level of complication is pretty low to do it thoracoscopically. Why would you bother to go through an umbilical approach?

Dr Chen. Sorry, can you repeat the question?

Dr Matthew Williams *(New York, NY)*. The question is, the thoracoscopic approach works well with a low complication rate, so how do you justify using this approach as opposed to the standard?

Dr Chen. We usually do the conventional thoracoscopic sympathectomy, but we find some patients suffer from chest incision pain, so I want to avoid the chest incision and find a new approach.

Dr Matthew Williams. I think it is very innovative. How do you close the diaphragm?

Dr Chen. It is very small. The size is just 5 mm, so it is too small to cause any hernia. So you do not need to close the incision of the diaphragm.

Dr Osman Al-Radi *(Jeddah, Saudi Arabia)*. The phrenic nerve is visible only from the thoracic side of the diaphragm. When you are puncturing the diaphragm from below, have you had any problems with injuring the phrenic nerve or diaphragmatic paralysis?

Dr Chen. Thank you for your question. The incision of the diaphragm is far from the center of the diaphragm, so I do not think it will cause injury of the nerve.